North Coast Watershed Assessment Program

DRAFT

Mattole Watershed Synthesis Report

The mission of the North Coast Watershed Assessment Program is to conserve and improve California's north coast anadromous salmonid populations by conducting, in cooperation with public and private landowners, systematic multi-scale assessments of watershed conditions to determine factors affecting salmonid production and recommend measures for watershed improvements.

Public Review Draft

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Executive Summary

Introduction

This report constitutes a first public review draft of the North Coast Watershed Assessment Program's (NCWAP) watershed assessment work on the Mattole River basin. The NCWAP was established in 2000 to provide a consistent scientific foundation for collaborative watershed restoration efforts and to better meet the State needs for protecting and restoring salmon species and their habitats under state and federal laws. The program includes the California Resources Agency, Department of Fish and Game (DFG), Department of Forestry and Fire Protection (CDF), Department of Conservation/Division of Mines and Geology (DMG), Department of Water Resources (DWR), the North Coast Regional Water Quality Control Board (NCRWQCB), and the Institute for Fisheries Resources (IFR).

This report's contents should be considered preliminary and subject to review and revision. This assessment was limited in scope (e.g., marine habitat and fishing effects on salmon were not considered), detail, and analysis in accordance with program goals, timeframes, and budget and schedules. There will be additional public and scientific review of this draft in order to refine analyses and revise recommendations as needed. A final watershed assessment report is to be completed in May 2002.

The Mattole River basin encompasses approximately 296 square mile of the Northern California Coast Range. A small portion of the Mattole's southern most headwaters originate in Mendocino County, but the vast majority of the basin is within Humboldt County. The Mattole has a Mediterranean climate characterized by cool wet winters with high runoff, and dry warm summers with greatly reduced flows. The Mattole basin receives one of the highest annual amounts of rainfall in California averaging 81 inches. The Mattole basin is mostly steep mountainous topography. Broad, alluvial streamside flats are present in the lower valleys. The total Mattole basin resident population in the year 2000 census was estimated at about 1,200 people. Eighty-four percent of the watershed is held and managed as private property. In the 1941 air photos, the most widespread land use of the watershed appears to have been grazing Timber harvest operations began in earnest during the post World War II boom.

By the late 1980s, timber harvesting decreased while environmental awareness increased. Changes in policy concerning management of Federal lands and the designation of the Northern Spotted Owl as federally threatened led to the designation of BLM lands, a large proportion of the Western and a smaller percentage of the Eastern subbasins, as Late Succession Reserve lands that are not subject to harvest (BLM, Bear Creek 1995).

Salmon, Stream, Watershed, Land-use Context

Chinook salmon, coho salmon, steelhead trout, and cutthroat trout populations have experienced severe declines on the West Coast, including North Coast California, during the past century. Fish ladder counts at two sites on the Eel River, the Mattole's nearest neighbor, reflect the approximately eighty percent reductions in coast wide anadromous salmonid stocks. Concerns over the status of coastal salmonids have led to many of them being listed under the authority of the federal Endangered Species Act, which has brought about ensuing regulation from the National Marine Fisheries Service.

Anadromous Pacific salmonids spend over half their life history in the marine environment, which is generally beyond man's control other than to regulate harvest. However, they are also dependent upon a high quality freshwater environment at the beginning and end of their life cycles. As such, they thrive or perish depending upon the availability of cool, clean water, free access to migrate up and down their natal streams, clean gravel for successful spawning, adequate food supply, and protective cover to escape predators and ambush prey.

These life requirement conditions can be identified and evaluated on a spatial and temporal basis at the stream reach and watershed levels. They comprise the factors that support or limit salmonid stock production.

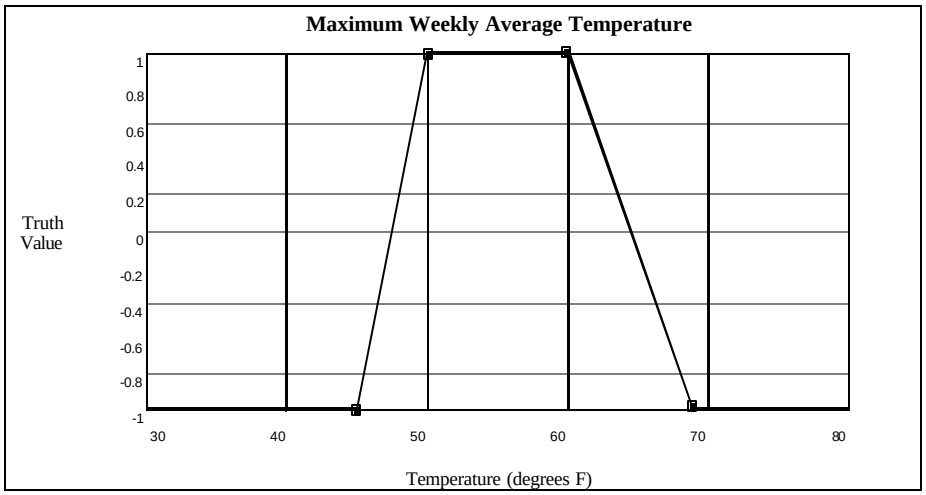
The results of a major watershed disruption, which can be created over time by many smaller disruptions, can drastically alter instream habitat conditions and the aquatic communities that depend upon them. In general, natural disruption regimes do not impact larger watersheds, like the 300 square mile Mattole, in their entirety at any given time. Rather, they rotate episodically across the watershed creating a shifting mosaic of habitat conditions. Human disturbances, although individually small in comparison to natural events, are often concentrated in time and space across basin level watersheds because market driven land uses tend to function in temporal waves, like the California Gold Rush or the post-WWII logging boom in Northern California. The intense human land use of the last century, combined with the energy of two mid-century, record floods on the North Coast, created stream habitat impacts at the basin and regional scales across most of the North Coast region, including the Mattole River.

Assessment Components

A main component of the NCWAP is an analysis of stream habitat conditions to identify factors that limit production of anadromous salmonids in North Coast watersheds. The "limiting factors analysis" (LFA) provides a means to evaluate the status of a suite of key environmental factors that affect anadromous salmonid migration, spawning, and juvenile rearing.

As part of the watershed assessment, the NCWAP team is using computer models called knowledge base or expert systems. The software allows scientists to combine data of different environmental factors, such as stream temperature and substrate composition, to produce a synthesis of watershed conditions for native salmonids. For this purpose, the NCWAP will employ a linked set of software: NetWeaver, Ecological Management Decision Support (EMDS) and ArcView™. NetWeaver. These networks resemble branching tree-like flow charts, and graphically show the logic and assumptions used in the synthesis.

The NCWAP scientists start from the proposition that the overall condition of a given watershed is suitable for maintaining healthy populations of native salmon and trout, and through the design of the knowledge base (the network) seek to evaluate the 'truth' of that assertion. To evaluate watershed conditions for salmonids, the scientists specified that data are required on upland condition, roads, passage barriers, and stream condition factors. In a similar manner, each of the four main environmental factor is actually made up of smaller constituent components. For example, 'upland condition' consists of more detailed data on land use, land cover (vegetation) and slope stability that determine it (not shown in the above figure). Scientists use simple graphs that show what are completely unsuitable temperatures (-1), completely suitable temperatures (+1) and those that are in-between (> -1 and <+1).



EMDS Response Curve

The software offers a number of advantages. The graphs and flow diagrams required that the NCWAP scientists be forthright and explicit in how they have defined suitable conditions for salmonids needed for the completion of their lifecycle. The nature of the networks assists open communication to the general public through simple graphics and easily understood flow diagrams. Another feature of the system is the ease of running alternative scenarios. Scientists and others can test the sensitivity of the assessments (i.e. perform 'sensitivity analyses') to different assumptions about the environmental factors and how they interact, through changing the knowledge-based network and breakpoints. NetWeaver ranks the environmental factors by their influence on the overall habitat indicator values derived. They also show which factors, with more complete and comprehensive data, would improve the quality of the analysis in the most cost-effective manner. Maps depicting those factors that may be the largest impediments, as well as those areas where conditions are very good, can help guide protection and restoration strategies. The EMDS model can also help to assess the cost-effectiveness of different restoration strategies.

Ecological Management Decision Support model runs conducted on the Mattole assessment indicate the headwaters (Southern, Eastern, and Western subbasins) areas of the system are in relatively good condition. The Northern and Estuarine subbasins are in relatively poor condition for supporting salmonid populations.

Subbasin Scale

Natural variation among subbasins is at least partially a product of natural and human disturbances. Other variables that can distinguish areas, or subbasins, in larger basins include differences in elevation, geology, soil types, aspect orientation, climate, vegetation, fauna, human population, land use and other social-economic considerations. The combined complexity of large basins makes it difficult to speak about them concerning watershed assessment and recommendation issues in other than very general terms. In order to be more specific and useful to planners, managers, and landowners, it is useful to subdivide the larger basin units into smaller subbasin units whose size is determined by the commonality of many of the distinguishing traits. For the purpose of this assessment, the Mattole Basin has been subdivided into five parts: the estuary and four distinct subbasins. (can you put map here?)

Conclusions and Recommendations

There are currently a number of impairments to salmonid habitat in the Mattole River watershed, but the watershed has a history of producing significant quantities of chinook and

coho salmon and steelhead trout. Identified impairments include high instream sediment levels, stream channel aggradation and widening (level of the streambed rises and widens due to deposition of sediment), lack of stream habitat structure such as deep pools, stream water temperatures that are too high to be suitable to salmon, loss of functioning estuary habitat due to channel filling, loss of connectivity with the sea, and warm summer freshwater temperatures. Human activities—such as road construction, grazing of livestock, timber management, and land development—have interacted with natural geologic instability and sediment production, major rainstorm events (e.g., the 1955 and 1964 floods) to contribute to these salmon habitat impacts. Limited water column chemistry monitoring in the Mattole River generally indicates no problems with nutrients, dissolved oxygen, phosphorous, and nitrogen.

Watershed problem sources on the Mattole are located more in the Northern and Eastern subbasins of the watershed, where steep slopes, higher geologic instability, higher road densities, and more intensive land uses are found. Impacts of these upper watershed effects, sedimentation in particular, tend to concentrate in the mainstem and lower reaches of the watershed due to cumulative effects and lower stream gradient. One particularly complex salmonid habitat suitability issue—stream water temperature—needs additional analysis in light of the multifaceted interrelationships between stream water temperature and factors such as air temperature, streamside vegetation, channel width, groundwater influences, basin size.

The sections below provide specific conclusions and recommendations for the five Mattole subbasins (Estuary, Northern Subbasin, Eastern Subbasin, Southern Subbasin, and Western Subbasin) delineated on the basis of geography, geology, climate, land use, and hydrology.

Estuary

The Mattole estuary provides an important transition between marine and freshwater environments. Because of their high productivity and isolation from predators, estuaries provide a very productive environment for fish. Sediment supply to the estuary is naturally high due to its downstream position at the mouth of the Mattole River. Naturally high erosion rates, major storms, upstream human-caused disturbances, and levee construction in the estuary have exacerbated sediment accumulation in the estuary and reduced the quantity and quality of habitat for salmon. Water temperatures in the estuary have exceeded the "fully" suitable range for salmonids since at least 1987, when monitoring began.

Improvements to estuary conditions for salmon must be initiated through sediment yield reduction efforts throughout the upstream areas of the system. Sediment input reduction is key to improvement in estuary conditions. The actions that could benefit the estuary are discussed in more detail in the sections for those upstream subbasins. In general, activities that reduce sediment generation and transport, and that help to lower water temperatures will benefit salmon habitat conditions in the estuary.

Subbasin Issues

- Sediment and temperature impacts are currently deleterious to summer rearing salmonid populations. Present conditions are a product of upstream natural processes and human land uses. Although summer water temperatures are currently documented to be higher than fully suitable EMDS values, there is not enough information over time to understand temperature trends. Because juvenile Chinook over-summer in the estuary, they are affected by temperature to a greater degree than steelhead or coho.

- The current stream reach EMDS model is not configured to assess estuarine conditions with its parameters. However, field observations during extensive

academic studies and ongoing field observations by the DFG and the Mattole Salmon Group, indicate pool habitat, escape and ambush cover, substrate embeddedness and water temperature are likely unsuitable for salmonids.

- The life cycle of young chinook historically included a summer rearing phase in lagoon or estuarine habitats. Juveniles typically entered the esturary in spring and left for the sea in autumn. In response to the hostile estuarine conditions for rearing chinook juveniles, the Mattole Salmon Group has conducted rescue rearing operations since 1994. The project traps down migrating chinook juveniles at river mile 3.0 adjacent to summer rearing tanks at Mill Creek, and releases them in the fall for out-migration. This project needs to continue as an assessment program to evaluate its efficacy by marking all released fish.

Subbasin Issue Synthesis

Working Hypothesis 1: ***The present state of estuarine habitat is limiting the production of salmonids, especially chinook, in the Mattole River.***

Supportive Findings:

- Estuaries provide critical habitat for all anadromous salmonid species.
- Sediment from upstream has been delivered by storm events and has accumulated in the low gradient estuarine channel.
- Sources of upstream sediment include natural background erosion and additional erosion from land use.
- Water temperatures in the estuary, as a result of warming effects upstream, periodically exceed a level that is fully supportive of salmonids (Dynamics of Recovery 1995).

Recommendations:

1. Continue the chinook juvenile rescue rearing program with a tagging and effectiveness monitoring program.
2. Institute a basin-wide road/erosion assessment, treatment and erosion control program to reduce sediment yield where possible. Follow land use guidelines in Department of Mines and Geology Note 50 (Department of Conservation, 1997; see Appendix X).
3. Maintain and enhance existing riparian cover. Use cost share programs and conservation easements as appropriate.
4. Monitor summer water and air temperatures on a continuous 24-hour basis to detect long-range trends and short-term affects on the aquatic / riparian community.
5. Examine the role of the mainstem Mattole River in elevated estuarine water temperatures.

Northern Subbasin

The Northern subbasin is located between the estuary and Honeydew Creek (River Mile 26.5) along the northeastern side of the Mattole mainstem. There are eighteen perennial streams that drain a watershed area of 98 square miles. The DFG has recently surveyed 10.6 miles of the subbasin's anadromous reaches. Elevations range from 5' at the estuary to approximately 2,500' in the headwaters of the tributaries. The watershed is largely managed for timber

production and cattle ranching. The town of Petrolia is located in this subbasin at the confluence of the Lower North Fork and the Mattole River. Some back-to-land homesteads are near Petrolia.

Subbasin Issues

- There is concern over abandoned roads, new road construction, and road maintenance issues related to land-sliding and sediment input. Without appropriate maintenance or storm proofing, existing roads, both active and abandoned, may continue to contribute high rates of sediment.

- Currently, there is no road assessment program in this planning basin.

- If future sub-division development is proposed, the county-imposed 40-acre minimum parcel sub-division ordinance with the preponderance of unstable slopes and sediment issues will need to be addressed.

- Water temperature data suggests that summer high temperatures exceed optimal conditions for salmon throughout much of this planning basin.

- Based upon limited samples from Oil and Rattlesnake creeks there is an indication that fine sediments may be approaching or exceeding levels that are considered suitable for diverse and complex salmonid habitat.

- Canopy cover is below EMDS target values. Instream movement of sediment appears to causing channel widening, leading to less stream canopy cover.

- Based on limited sampling, mainly in the Upper North Fork drainage, coho have not been found. Four years of electrofishing in three streams (Oil, Green Ridge, and Rattlesnake creeks) show stable multi-year class populations of juvenile steelhead.

- Large woody debris recruitment potential is very poor overall due to naturally occurring geologic conditions. Land use practices may be exacerbating the naturally occurring adverse conditions.

- Fish population information is poor due to access issues for surveys. In order to protect privacy while developing data, the possibility of training local landowners to survey their own streams to conduct salmonid population status surveys would be advisable to help determine fish populations throughout this planning basin.

Subbasin Issue Synthesis

Working Hypothesis 1: ***Summer stream temperatures in many subbasin tributaries are not within the range of temperatures that are fully suitable for healthy anadromous salmonid populations.***

Supportive Findings:

- Summer stream temperatures were measured to exceed levels fully suitable for salmonids at most locations sampled.

- Shade canopy levels appear to be low as a function of both riparian cover depletion from land use and stream widening due to high sediment inputs, especially in 1964.

- Air photo analysis indicates that historic timber harvest has reduced canopy closure in near stream areas.

- Air and historic photo documentation, after the 1955 and 1964 floods, indicate significant changes in many channels in the Northern subbasin.

Working Hypothesis 2: ***Aggradation from fine sediment in some stream channels of this subbasin has reduced channel diversity needed to provide suitable conditions for anadromous salmonid populations and has compromised salmonid health.***

Supportive Findings:

- Field surveys indicate that sediment delivery has had an adverse and long lasting impact to salmonid habitat in the Northern subbasin.

- Air photo analysis indicates that the lower reaches of the large tributaries to the Mattole River are highly aggraded with fine sediment.

- Late summer field observations indicate that aggradation and channel widening have likely contributed to a loss of surface stream flow.

Working Hypothesis 3: ***A lack of large woody debris in some stream reaches of this subbasin has reduced channel diversity needed to provide suitable conditions for anadromous salmonid populations and has compromised salmonid health.***

Supportive Findings:

- Field observations indicate that amounts of instream large woody debris in the mainstem Mattole River and its tributaries in the Northern subbasin are low.

- Riparian vegetation is in size classes that are not expected to contribute large woody debris in significant quantities in the near future.

Recommendations:

1. Ensure that near stream areas are managed to reduce solar radiation and moderate air temperatures in order to reduce heat inputs to the Mattole River and its tributaries.

2. Monitor summer water and air temperatures to detect trends using continuous, 24 hour monitoring thermographs.

3. Where current canopy is inadequate and site conditions are appropriate, initiate tree planting and other vegetation management and livestock management techniques to hasten the development of denser and more extensive riparian canopy.

4. Encourage the use of cable or helicopter yarding on steep and unstable slopes to reduce soil compaction, surface disturbance and resultant sediment yield.

5. Encourage the monitoring of in-channel sediment and tracking of aggraded reaches in the lower basin by establishing monitoring stations and training personnel.

6. Maintain and enhance existing riparian cover. Use cost share programs and conservation easements as appropriate.

7. Based upon the latest science on placement of large woody debris instream channels, managers in the Northern subbasin should work to improve channel structure and function, and habitat complexity and diversity for salmonids.

8. Develop alternatives to unrestricted stock access to aquatic riparian areas where livestock damage has occurred.

9. Continue efforts such as road erosion proofing, improvements, and decommissioning throughout the basin to reduce sediment delivery to the Mattole River and its tributaries.

Eastern Subbasin

The Eastern subbasin is located between Honeydew Creek (River Mile 26.5) and Bridge Creek (River Mile 52.1) along the eastern side of Wilder Ridge, and the Mattole mainstem above Bear Creek, for a distance of about 25.6 river miles. There are fifteen perennial streams that drain a watershed area of 79 square miles. The DFG has recently surveyed 22.2 miles of the subbasin's anadromous reaches. Elevations range from 344' at Honeydew Creek to approximately 2,300' in the headwaters of the tributaries. The Eastern Subbasin has the highest rainfall averages in the Mattole, ranging from 85 inches near Thorn Junction to 115 inches in the hills east of Honeydew. Temperatures are typical of other inland areas of California with sub-freezing winter temperatures and above 100° F summer temperatures.

Subbasin Issues

- Roads – There is concern over abandoned roads and new road construction, and road maintenance issues related to land-sliding and sediment input. Without appropriate maintenance or storm-proofing, existing roads, both active and abandoned, may continue to supply sediment. Road inventories have been completed for a small portion of this planning basin, and it is recommended that this effort be continued until a complete inventory is compiled.

- This planning basin is heavily sub-divided so that there is high impact on the land from road density, human habitation, land disturbance from building of structures, and land modification, including diversion of surface waters.

- A diesel spill in Blue Slide Creek, reported in April 2000 to the North Coast Regional Water Quality Control Board, is currently undergoing remediation and monitoring by the Board.

- Water temperatures – Available data suggests that summer high temperatures exceed optimal conditions throughout much of this planning basin in the lower depositional reaches of most tributaries. Mattole Canyon Creek has elevated temperatures in most of its reaches.

- Large woody debris recruitment potential is generally adequate for the majority of this planning basin with the exception of the highland grassland areas along the eastern margins.

- Based on limited fish sampling, few coho and no chinook have been found in tributary surveys. In 2001, the DFG Coho Assessment Project staff found coho in two streams in the subbasin. Steelhead populations are well distributed and are represented with diverse age classes. Additional sampling is needed to better determine the distribution and abundance of salmonids throughout this area.

- In-stream habitat diversity and complexity – Based on available data, instream habitat appears to be insufficiently diverse. In many streams inadequate pool depth and a lack of cover and large woody debris have contributed to a simplification of instream fish habitat.

- In order to protect privacy while developing data, the possibility of training local landowners to survey their own streams to conduct salmonid population status

surveys would be advisable to help determine fish populations throughout this planning basin.

Subbasin Issue Synthesis

Working Hypothesis 1: ***Summer stream temperatures in many subbasin tributaries are not within the range of temperatures that are fully suitable for healthy anadromous salmonid populations.***

Supportive Findings:

- All MWATs for Westland Creek, Mattole Canyon Creek, Blue Slide Creek, and Eubanks Creek were above the 50-60ºF suitable range for coho growth for in samples taken from 1996-2001 except Eubanks Creek in 2001.

- Low canopy levels appear to be a function of both riparian cover depletion from land use and stream widening due to high sediment inputs, especially in 1964.

Working Hypothesis 2: ***Tributary conditions in the Eastern subbasin are the most variable in the Mattole Basin concerning water temperature, habitat diversity, and sediment production.***

Supportive Findings:

- The DFG Coho Assessment Project found coho salmon in three subbasin tributaries with good habitat and favorable water temperatures in 2001.

- However, four tributaries had water temperatures that were not in the suitable range for salmonids.

Recommendations:

1. Ensure that near stream areas are managed to reduce solar radiation and moderate air temperatures in order to reduce heat inputs to the Mattole River and its tributaries.

2. Where current canopy is inadequate and site conditions are appropriate, use tree planting and other vegetation management techniques to hasten the development of denser and more extensive riparian canopy.

3. Monitor 24 hour summer water and air temperatures to detect trends using continuous monitoring thermographs.

4. Encourage the monitoring of in-channel sediment and tracking of aggraded reaches in the lower basin by establishing monitoring stations and training personnel.

5. Based upon the latest science on placement of large woody debris in stream channels, managers in the Western Subbasin should work to improve channel structure and function for salmonids.

6. Continue efforts to conduct and implement road and erosion assessments such as in the Dry and Westlund planning watersheds. Road improvements and decommissioning throughout the basin to reduce sediment delivery to the Mattole River and its tributaries should be initiated.

Southern Subbasin

The Southern Subbasin is located south of Bridge Creek (River Mile 52.1) and McKee Creek (River Mile 52.8), both near Thorn Junction, and continues upstream to the Mattole's headwaters near Four Corners (River Mile 61.5), a distance along the Mattole mainstem of about 9.4 river miles. There are twenty-seven perennial blue line streams that drain a watershed area of 28 square miles. The DFG has recently surveyed 21.9 miles of the subbasins anadromous reaches. Elevations range from 930' at Bridge Creek to approximately 1,500' in the headwaters of the tributaries. The King Range immediately west of the area influences the Southern Subbasin temperature and precipitation totals. Temperatures reflect the inland location ranging from sub-freezing to above 100° F but generally stay between 55° and 85° F. Rainfall totals average between 70 and 85 inches.

Subbasin Issues

- The use of herbicides on industrial timberlands is of concern to local residents for both human health and water quality reasons. The impacts of these applications have not been quantified in this planning basin. Further study of this issue would be recommended.

- There is a higher risk of catastrophic fire in this subbasin due to the high density of human inhabitance in proximity to wild lands.

- Limited road assessment and treatment has been completed in this subbasin. These efforts should be expanded because of the potential for further sediment delivery from active and abandoned roads, many of which are in close proximity to stream channels.

- There is high impact on land in this area from road density, human habitation, human waste disposal, and land disturbance from building of structures, land modification, and water accumulation and run-off patterns.

- Excessive extraction of water from springs, tributaries, and the mainstem during summer low flow periods may be extremely detrimental to fish survival, particularly in drought years.

- Water temperatures in this planning basin are favorable for summer rearing of juvenile salmonids. Recent instream sediment sampling data indicates that there are continuing inputs of fine sediments, but this does not appear to be a major limiting factor for salmonid production.

- Suitable water temperatures in most streams reflect adequate canopy shade for summer rearing of juvenile salmonids. The best remaining habitat in the Mattole basin is found in this area. This translates to the highest fish productivity rate in the Mattole basin.

- Fish density appears to be adequate relative to habitat conditions.

- Very high loading of instream of large woody debris has been enhanced by restoration projects since 1996. Future natural recruitment potential for large woody debris is higher in this area because substantial riparian areas along the mainstem are devoted to conservation purposes.

- The DFG has conducted analysis on macroinvertebrate data collected by the BLM since 1996 on six subbasin streams. The results show the samples were either fair to good, or good in terms of overall conditions. Additional data for aquatic macroinvertebrate productivity would be useful for effectiveness monitoring purposes.

- There is no available data on pH, DO, nutrients, etc.

- Removal of in-stream large woody debris by the DFG and the California Conservation Corps occurred in about twenty-one miles of streams in this subbasin during the 1980's. A total of 36,800 cubic feet of wood was removed. This is equivalent to 294 logs 2' x 40'. This activity likely had adverse local impacts on salmonid habitat conditions. Beginning in 1996, a series of DFG funded instream enhancing projects by the Mattole Salmon Group have restored much of the complexity by the addition of large woody debris to key stream reaches.

- Wildlife/Plants -- Inadequate information exists to assess the status and trends of flora and fauna, including invasive species.

- Opportunities for public recreation in this area are available but limited.

- A major salmonid rearing facility exists in the headwaters, operated since 1982 by the Mattole Salmon Group. This operation has been successful and should be continued in order to supplement wild populations of chinook salmon.

- In order to protect privacy while developing data, the possibility of training local landowners to survey their own streams to conduct salmonid population status surveys would be advisable to help determine fish populations throughout this planning basin.

Subbasin Issue Synthesis

Working Hypothesis 1*: **Watershed and stream conditions are the most supportive of salmonids in the Mattole Basin.***

Supportive Findings:

- All three species of the Mattole Basin's anadromous salmonids are present in tributaries to the Mattole River in this subbasin.

- In general, MWATs in the Southern Subbasin are tightly aggregated in the high 50 to low 60ºF range. This is within the range suitable for salmonids.

- The DFG Coho Assessment Project found coho in three subbasin tributaries in 2001.

- V* was 0.04 in Bridge Creek in 2000, which is exceptionally low and may indicate low sediment production due to few, if any, upslope disturbances or rapid sediment transport through well armored pools that may experience high rates of scour during storms.

- The DFG has conducted analyses on macroinvertebrate data collected by BLM since 1996 on six subbasin streams. The results show the samples were either fair to good, or good in terms of overall conditions.

Contrary Findings:

- The mainstem Mattole River in this subbasin is intermittent and dewatered above the confluence with Mill Creek.

Working Hypothesis 2: ***Some reaches of streams in the subbasin are not fully suitable for salmonids due to stream flow reductions related to human diversion.***

Supportive Findings:

- Data from the 2000 Census shows that Southern subbasin has the most concentrated human population in the Mattole Basin at 7.4 people per square mile and that most of them are concentrated along the upper Mattole River and its major tributaries.

- Field observations indicate that intermittent flow and dewatering of the mainstem Mattole headwaters area (above Whitethorn) occurs in dry years.

Recommendations:

1. Ensure that this high quality habitat is protected from degradation.

2. Encourage reducing the unnecessary and wasteful use of water to improve river flows and fish habitat.

3. Monitor summer water and air temperatures to detect trends using continuous 24 hour monitoring thermographs.

4. Encourage the monitoring of in-channel sediment and tracking of aggraded reaches in the lower basin by establishing monitoring stations and training personnel.

5. Encourage the use of cable or helicopter yarding on steep and unstable slopes to reduce soil compaction, surface disturbance and resultant sediment yield.

6. Continue efforts such as road assessment, improvements, and decommissioning throughout the basin to reduce sediment delivery to the Mattole River and its tributaries.

Western Mattole Subbasin

The Western Subbasin is located between the Bear Creek in the estuary (River Mile 0.3) and the headwaters of the South Fork of Bear Creek (River Mile 50) along the western side of the Mattole mainstem and Wilder Ridge for a distance of about sixty miles. There are thirty perennial streams that drain a watershed area of 89 square miles. The DFG has recently surveyed 41.5 miles of the subbasin's anadromous reaches. Elevations range from 20' at the estuary to approximately 2,800' in the headwaters of the tributaries in the King Range. Kings Peak, at 4,087' is the highest point in the Mattole River basin. The subbasin is greatly influenced by the King Range, which is its western boundary. Temperatures have a wide range because the mountains cut off the moderating effect produced by marine air. Precipitation totals vary from 70 to 100 inches annually.

Subbasin Issues

- Roads – The rural road system is not as extensive as in the other subbasins; however, there is concern over abandoned roads, and road maintenance issues related to landsliding and sediment input on both public and private lands. Without appropriate maintenance or storm proofing, existing roads, both active and abandoned, may continue to supply sediment. BLM is actively removing or "erosion proofing" many of their roads.

- Sub-division and associated impacts are restricted to the northern and eastern margins of this planning basin, outside of the publicly owned lands. BLM's road access policies pertaining to public lands are an ongoing issue with residents adjacent to the public lands.

- Limited water chemistry data available indicates acceptable pH, DO, and nutrient levels.

- Summer high temperatures exceed the suitable range for salmonid rearing in the lower reaches of the larger streams. Temperatures are within optimal conditions in upstream reaches of larger and smaller tributaries sampled.

- Based on limited sampling, instream conditions indicate moderate sediment levels. The limited data available suggests that there is a degradation of habitat due to instream sediment accumulation in the lower gradient reaches of the larger tributaries.

- Large woody debris recruitment potential is currently poor for the majority of this planning basin but is expected to improve over time as a result of the BLM management policies within the King Range National Conservation Area.

- The DFG has conducted a preliminary analysis on data collected by BLM since 1996 on seven tributary streams. The results show the samples were rated as good in terms of overall conditions. Additional data for aquatic macroinvertebrate productivity would be useful for effective monitoring purposes.

- Removal of in-stream large woody debris by the DFG and the California Conservation Corps occurred in about forty-nine stream miles in this subbasin during the 1980's. A total of 19,136 cubic feet of wood was removed. This is equivalent to 153 logs 2' x 40'. This activity likely had adverse local impacts on salmonid habitat conditions. Instream habitat diversity and complexity was impacted by this action.

- Based on current surveys available, instream habitat appears to be recovering.

- In-stream habitat diversity and complexity, based on available survey data, i.e. pool depths, cover, and large woody debris may be adequate for salmonid production.

- All three anadromous salmonid species are present. In 2001, the DFG Coho Assessment Project staff observed coho in four streams in this subbasin. The upper reaches the three major tributaries in this basin are considered good refugia, and this will continue due to BLM ownership and management of key headwater reaches. Fish populations are low at this time, but are expected to increase due to public stewardship within the basin.

- Three salmon rearing facilities are located within this planning basin and have been operated by the Mattole Salmon Group since the mid 1980's. These operations have generally been successful and should be continued in order to supplement wild populations of chinook & coho salmon to allow long-term restoration efforts to work.

- In order to protect privacy while developing data, the possibility of training local landowners to survey their own streams to conduct salmonid population status surveys would be advisable to help determine fish populations throughout this planning basin.

Subbasin Issue Synthesis

Working Hypothesis 1: ***Summer stream temperatures in some subbasin tributaries are not within the range of temperatures that provide suitable conditions for healthy anadromous salmonid populations.***

Supportive Findings:

- MWATs for Honeydew Creek and Bear Creek reached 78.5ºF in 1999 and 71.5ºF in 1998 respectively.
- Squaw Creek had MWATs ranging from 70.4ºF in 1998 to 69.5ºF from 1996-1999.
- Historic timber harvest has reduced canopy closure in near stream areas and likely contributed to elevated stream temperatures.

Contrary Findings:

- MWAT of 57.9ºF for 2001 in Nooning Creek.
- MWATs in Mill Creek (lower) consistently within one degree of 58ºF for 1997, 1998, 1999, 2001, 1998-1999.

Working Hypothesis 2: ***Aggradation from fine sediment in some stream channels of this subbasin has reduced channel diversity needed to provide suitable conditions for anadromous salmonid populations and has compromised salmonid health.***

Supportive Findings:

- Air photos and field observations show that the Mattole River bordering the Western subbasin downstream of Honeydew Creek is highly aggraded with sediment.
- Field surveys of Lower Honeydew Creek and Squaw Creek found less than 40% of their lower reaches by length were composed of pools, indicating a lack of pool habitat.
- Air photos after the 1955 and 1964 floods indicate significant changes in the stream channel in the Western subbasin.

Contrary Findings:

- V* of 0.26 for Mill Creek, 0.24 for Squaw Creek and 0.22 for Honeydew Creek in 2000 indicating low to moderate residual pool filling.

Working Hypothesis 3: ***A lack of large woody debris in some stream reaches of this subbasin has reduced channel diversity needed to provide suitable conditions for anadromous salmonid populations and has compromised salmonid health.***

Supportive Findings:

- Field observations indicate that amounts of instream large woody debris in the mainstem Mattole River and its tributaries in the Western subbasin are low.
- Historic timber harvest throughout the Western Subbasin tributaries frequently removed large conifer vegetation down to the stream bank, severely reducing the available recruitment supply of large woody debris.
- Riparian vegetation is in size classes that are not expected to contribute large woody debris in significant quantities in the near future.

Recommendations:

1. Ensure that near stream areas are managed to reduce solar radiation and moderate air temperatures in order to reduce heat inputs to the Mattole River and its tributaries.

2. Monitor summer water and air temperatures to detect trends using continuous 24 hour monitoring thermographs.

3. Where current canopy is inadequate and site conditions are appropriate, use tree planting and other vegetation management techniques to hasten the development of denser and more extensive riparian canopy.

4. Encourage the monitoring of in-channel sediment and tracking of aggraded reaches in the lower basin by establishing monitoring stations and training personnel.

5. Continue efforts such as road improvements and decommissioning throughout the basin to reduce sediment delivery to the Mattole River and its tributaries. Road inventories have been completed for a much of this planning basin, and it is recommended that this effort should be continued until a complete inventory is compiled.

6. Maintain and enhance existing riparian cover. Use cost share programs and conservation easements as appropriate.

7. Based upon the latest science on placement of large woody debris in stream channels managers in the Western subbasin should work to improve channel structure and function for salmonids.

Next Steps

As we move forward through the draft process of this document's development, we intend to expand this list of recommendations to include specific project types and locations. NCWAP intends to enable landowners and other interested public and private parties to focus their energies from the general basin-level issues, like chronic sedimentation, and overly warm water in the Mattole basin, to specific project level activities that can be accomplished and will cumulatively make a difference to the larger problems. With this focused and orderly approach to multi-scale assessment and project recommendation, efforts can be directed on a priority basis to the most effective improvement projects and stewardship sites.